

**A STUDY GUIDE** *for*  
**Irene Pepperberg**  
**in Conversation**



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## Getting to the Core:

Excerpt from Irene Pepperberg's *Alex & Me: How a Scientist and a Parrot Discovered a Hidden World of Animal Intelligence—and Formed a Deep Bond in the Process*, HarperCollins Publishers, 2008.

### Alex's First Labels

I'm not sure who was more nervous in our first days together, Alex or me. I know I was a little on edge, and he sure looked it, the poor traumatized bird. He'd been snatched from what had been his home for many months and thrust into a completely new environment, a small, fairly bare room occupied by a scary parakeet and unfamiliar humans. I considered myself a bird person, but I'd never had such a big bird before, and I was more than a little unsure about how best to handle him. I knew what food and drink to give him. I knew I needed to talk softly and soothingly to him at first, and give him treats. I understood that I had to build his trust in me.

It didn't start well. Alex was still uneasy on the second day, still scared of the parakeet. I decided to move Merlin's cage to another room. I then went back to Alex and tried to encourage him to perch on my arm. He wouldn't even come out of the cage, despite my gentle verbal entreaties. The phone in the adjacent room rang; I went to answer it. By the time I returned to the lab, a minute at most, Alex had climbed out of his cage. Yes! Progress. I offered him some fruit, which he fussed with but didn't eat. I held out my arm for him to perch, and he clumsily climbed onto it. I imagined he had never perched on someone's arm before. More progress.

Not for long. Clearly still alarmed, Alex tried to fly, and promptly crashed to the floor because his wings had been clipped back at the pet store. He was squawking pathetically, flapping his wings wildly. Suddenly there was blood everywhere, spraying this way and that. He had broken a new wing feather. Poor Alex was freaking out, and so was I, but I tried to appear calm so as not to upset him any more than he was already. Having dealt with broken feath-

ers with my parakeets, I knew what to do. But I was facing a very frightened and significantly larger bird here, not a comfortably established pet parakeet. That made it much harder, more hazardous. I eventually managed to gather him up, remove the feather, and get him back into his cage. He was obviously badly shaken. "Alex does not come out more that day, scared of me," I wrote in the journal I started when Alex arrived. Who could blame him? Over the next few days Alex became a little braver, bit by tiny bit. He started to come out of his cage spontaneously, but was still very wary of me. On the third day he did perch on my hand, by accident: he had tried to avoid me, but found himself perching for a few seconds. I started to give him objects, such as paper and pieces of wood, to explore his preferences. I planned to begin by teaching him labels for things he liked, figuring it would speed up the learning process. It turned out that he loved paper index cards even more than food. He chewed them enthusiastically, rapidly tearing them to shreds.

Day four was even better. Alex again came out of his cage spontaneously and even perched voluntarily for a short time. He continued to enjoy chewing paper. When I gave him some I said things like, "Paper, here's your paper," placing emphasis on the relevant label. My friend Marion Pak, who volunteered to help train Alex, came to meet him for the first time. He immediately took to her, perched easily, and spent an hour seeming quite content with her. And why not? She wasn't the one who had subjected him to torture in a dark box for hours, tossed him on the floor, and broken a feather.

I needed Marion's help with Alex because I was going to use a modified form of a training method I had researched while at Harvard. I'll describe it in more detail later. Essentially, though, the method involves two trainers, rather than the usual one, and they take turns asking each other about an object's label, with Alex observing. Then either one would query Alex, using the same words. The idea was that he would learn in a social context. This procedure was radically different from what would have been considered normal at the time. Marion and I started such training that day, on the label "paper."

After Marion left that morning I stayed with Alex for another hour. I purposely ignored him until he made a noise, then I rewarded him with paper, again saying, "Paper, Alex, here's your

paper." Any parrot owner can tell you that their bird may spontaneously learn some random words, but that's not the same as teaching meaningful communication. The first small step in Alex's training was for me to link any novel sound to the single object paper, as Marion and I had done in training earlier. The only vocalization Alex made was something like "Auf," which seemed exploratory, and a rasping, subvocal noise he made randomly. As I gave him one index card I said, "OK, Alex, there's a long way to go, buddy." Alex didn't say anything, just continued shredding paper and wiping his beak. But we had started our work together at last. It turned out that beginning training with "paper" was an extremely bad choice, because it is very hard to make a "puh" sound if you don't have lips. But Alex himself had made the choice, so we were stuck with it.

During the next four or five weeks I steadily raised the bar for Alex, to push him to achieve more and more. For instance, during training, Marion and I waited for some kind of two-syllable utterance—resembling "pa-per" in rhythm if not in actual sounds—before we would reward him with some paper. That's what is called the "acoustic envelope," the sound shape of the word. We also introduced a silver-colored key to Alex, so that he wouldn't come to associate verbalizing only with paper. He became steadily more vocal and began to produce sounds like "ay-er" when Marion and I asked him "What's this?" when showing him paper, and "ee" for the key. Sometimes he got confused and combined the sounds, like "ee-er." But he was definitely beginning to get it.

Within just a few weeks of beginning training, Alex was indisputably using vocal labels to identify specific objects. He was not merely mimicking, or parroting, us. The first real indication of this happened on July 1. I had seen that he liked to use paper to clean his beak, especially after eating something messy, such as fruit. I'd often give him apple so he'd need paper, which initially he would indicate by some fairly indecipherable vocalizing. That day, however, I gave him apple but forgot about the paper. He was on top of his cage, as usual, and gave me one of those OK, what's the problem, lady? looks that he would hone to perfection over the years. He ambled to the edge of the cage, looked down to where I stored the index cards in a drawer, and said "ay-ah," or something very like that. It certainly wasn't his spontaneous little gravelly sound.

I was thrilled, but wanted to make sure it wasn't accidental. I

gave him paper to reward that first “ay-ah,” and he chewed it happily for a while. I then held up another piece and asked him what it was. He said “ay-ah” again. And I rewarded him again. That happened half a dozen times. The seventh time he’d obviously had enough. He began preening energetically and occasionally chattering in his gravely voice. Alex was always capable of letting me know when he was tired of lessons!

“What a day!” That’s how I began my journal entry on August 4. Marion trained with me again that day. “[Alex] did amazingly well!” I wrote. “He corrected himself, gave us the objects—even improved on pronunciation.” He’d produced the best “puh” sound so far, saying “pay-er.” And his accuracy at labeling “key” jumped dramatically. “It was as if he finally made the connection,” I wrote triumphantly. It was a “I think he’s got it; by George he’s got it” moment.

The next day’s journal entry starts: “Alex incredibly stupid today! He acts as tho’ he’s forgotten yesterday existed! Almost impossible to get him to say a decent KEY. PAPER never clear. What happened?” It was very frustrating, to say the least. I was bewildered. For his part, Alex seemed quite content. He happily ate banana when I gave it to him, and made soft sounds. And he was beginning to look resplendent, as new feathers were coming in to replace ones he’d plucked early on, in his initial nervousness. I especially admired the new crimson tail feathers. But “key” and “paper” appeared to be far from his mind.

Only later did we learn that this pattern of behavior is quite normal. The Swiss psychologist Jean Piaget has argued that when children learn something new, they need time to assimilate it before using it with ease. When we started to tape Alex’s solitary evening babbling some years later, we frequently heard him “practice” a newly acquired word very clearly, even though earlier in

the day he had completely failed to say it. Quite likely, during those evenings of August 4 and 5, Alex was cheerfully producing lucid renditions of “pay-er” and “key” to himself repeatedly. But we had no way of knowing that.

A little later, he displayed another clue to his increasing understanding of sounds as labels. A few weeks after the “by George he’s got it” moment, he correctly identified a red key as “key,” even though we had trained him only on silver keys: he knew that a key was a key, whatever its color. It was his first demonstration of what psychologists call “transfer.” This kind of vocal cognitive ability had never before been demonstrated in nonhuman animals, not even in chimpanzees. This was a very, very good start.

It wasn’t all eureka moments in those first few months, and I have journal entries to prove it. In addition to the August 5 “Alex incredibly stupid today!” entry, I have many, many more: “Alex awful grumpy”; “One grouchy bird”; “Alex acts dumb today”; “Alex totally crazy this morning”; “Alex is totally impossible today, doing his war dance”; and so on. Maybe he had his reasons for these off days. I have no idea. But they became fewer as he became more confident, as we bonded as partners and built trust between us. We became less wary of each other. Nevertheless, for the first couple of years he remained extremely cautious with strangers, to say the least. He would shake, cower, and occasionally shriek. He often refused to cooperate with me when someone he didn’t know was in the lab.

Yet he also began to assert himself with me. “Alex has become rather demanding if he’s not promptly rewarded,” I wrote on September 1. “After saying PAPER he repeats it more loudly and more quickly” if I was slow to produce it. It was as if he were saying, C’mon, get moving, lady. I’m Alex. I want it now! It was my first glimpse of a

## Reflection:

An excerpt from *Wild Justice: The Moral Lives of Animals* by Marc Bekoff and Jessica Pierce, University of Chicago Press, 2009.

Both popular and scientific media constantly remind us of the surprising and amazing things animals can do, know, and feel. However, when we pay careful attention to the ways in which animals can negotiate their social environments, we often come to realize that what we call surprises aren’t really that surprising after all. Take, for example, the story of a female western lowland gorilla named Binti Jua, Swahili for “daughter of sunshine,” who lived in the Brookfield Zoo in Illinois. One summer day in 1996, a three-year-old boy climbed the wall of the gorilla enclosure at Brookfield and fell twenty feet onto the concrete floor below. As spectators gaped and the boy’s mother screamed in terror, Binti Jua approached the unconscious boy. She reached down and gently lifted him, cradling him in her arms while her own infant, Koola, clung to her back. Growling warnings at the other gorillas who tried to get close, Binti Jua carried the boy safely to an access gate and the waiting zoo staff.

This story made headlines worldwide and Binti Jua was widely hailed as an animal hero. She was even awarded a medal from the American Legion. Behind the splashy news, the gorilla’s story was adding fuel to an already smoldering debate about what goes on inside the mind and heart of an animal like Binti Jua. Was Binti Jua’s behavior really a deliberate act of kindness or did it simply reflect her training by zoo staff?

... continued ...

We’ll never know why Binti Jua did what she did. But now, years later, the amazing amount of information that we have about animal intelligence and animal emotions brings us much closer to answering the larger question raised by her behavior: can animals really act with compassion, altruism, and empathy? The skeptics’ numbers are dwindling. More and more scientists who study animal behavior are becoming convinced that the answer is an unequivocal “Yes, animals really can act with compassion, altruism, and empathy.” Not only did Binti Jua rescue the young boy, but she also liberated some of our colleagues from the grip of timeworn and outdated views of animals and opened the door for much-needed discussion about the cognitive and emotional lives of other animals.

very different, more assertive personality that would soon emerge in full force.

When I arrived at Purdue at the very beginning of 1977, I knew exactly what I wanted to do. But I found myself in a quasi-Catch 22 situation. I needed grant money to support my research program, to pay for assistants, bird food, all the objects Alex was to label; to cover fees for my own laboratory space and maybe even a small salary for myself; but I didn't have a faculty position. It is very, very difficult—not impossible, but very difficult—to be awarded a research grant from the major funding agencies if you don't have a faculty position. At the same time, the authorities at Purdue said they might be able to give me a nonfaculty research position if I could get a grant. (It was made pretty clear to me that I was regarded as a faculty wife, David's, and that I should be content with that, rather than being a nuisance by trying to get a faculty position for myself, too.)

Nevertheless, I did secure a small piece of lab space in which to do my work, kindly loaned to me by Peter Waser, an evolutionary biologist in the department of biological sciences. With a little artifice on my part with the dean, and the support of the department head, Struther Arnott, I managed to submit a grant proposal to the National Institute of Mental Health early in 1977, months before I even got Alex.

My proposal was simple: I said I wanted to replicate the linguistic and cognitive skills that had been previously achieved with chimps in a Grey parrot, an animal with a brain the size of a shelled walnut, but one that could talk. My confidence that I could do it was based on two things. The first was my experience growing up with talking birds, and the sense that they are indeed smart. Second were the facts that Greys, like apes, live a long time, and that their social groups are large and complex. Both these factors were thought to account for at least some of the brainpower that apes so obviously possess. Why not a similar kind of brainpower for Greys?

My plans for training Alex differed from the accepted standards of the time. Under the prevailing psychological dogma known as behaviorism, animals were seen as automatons, with little or no capacity for cognition, or thought. Biology was little better, dominated by theories claiming that much of animal behavior was innately programmed. Experimental conditions for working with

animals were very tightly prescribed. Animal subjects were actually supposed to be starved to 80 percent of their body weight so they would be eager for the food given for a "correct" response. They were also to be placed in a box so that the appropriate "stimuli" could be very tightly controlled and their responses precisely monitored. The technique was known as "operant conditioning." This was, to me, completely crazy, not to put too fine a point on it. It was contrary to all my gut instincts and commonsense understanding of nature.

For a start, isn't it blindingly obvious that communication is a social process, and that learning to communicate is a social process, too? It seemed clear to me that putting an animal in a box and expecting it to learn to communicate could not succeed. Several researchers had attempted to do this with mimetic birds and had failed spectacularly. They blamed the failure on a supposed deficiency in the brains of the birds, whereas I felt strongly that it was due to a deficiency in the researchers' assumptions and approach.

In fact, the first people working on human-animal communication in chimps in the late sixties and early seventies had not followed the behaviorism model. For the most part they had adopted much more naturalistic training techniques. Nevertheless, I still felt something was missing. And I couldn't quite treat a parrot the way the researchers were able to treat a baby chimp like a baby human, living with it 24/7 and still maintaining some objectivity. While mulling over this conundrum in 1975, I came across a paper by the German ethologist Dietmar Todt, published in what to me was an obscure German journal. In it he described his so-called model/rival program of training, which I adapted for working with Alex.

As I said earlier, under this system, instead of having one trainer, an animal subject had two. The principal trainer, A, would ask the secondary trainer, B, to name an object A showed to her. If B answered correctly, A would reward her; an incorrect answer would result in scolding. Trainer B is the "model" for the animal subject and its "rival" for the attention of trainer A. From time to time, trainer A would ask the animal subject to name the object, and it would be rewarded or scolded accordingly. Todt reported that Greys had learned speech very rapidly under this approach.

As soon as I read about Todt's work, I knew he was right, as

far as he went. As promising as the approach was, I felt that one could not be certain that the birds understood the sounds they were using. To me, comprehension was key. If, for instance, Alex could produce a string of labels, no matter how clearly he enunciated them, it would be little more than mimicking if he didn't know that they were labels for specific objects or actions. I decided I would modify Todt's method, by, for instance, having trainers A and B alternate roles, so that the bird would learn that either role was possible. In addition, I would have the reward for a correct answer be possession of the object itself. If Alex were to correctly identify "paper," I or my partner would give it to him. Same with "key," "wood," anything. In this way the label and the object would become closely associated in his mind.

Bear with me as I wrap up this description of my training methods, using terms you'd be unlikely to hear in everyday descriptions of parrots learning words in people's homes. What I was planning to do wasn't an everyday exercise, of course. I was planning to demonstrate in a parrot cognitive processes that only humans and higher primates were considered capable of achieving. You need very special conditions to do that and, equally important, to have people believe what you might be claiming.

My training model would have three components. The first is reference, that is, what the word, or label, "means"; for example, the word "paper" refers to the physical object. The second, functionality, is the pragmatics of how the word is used; the reason to learn some odd set of sounds is that you can use it to get a specific, desired reward. The third is social interaction, that is, the back-and-forth, the relationship, between trainer and subject. The stronger the relationship, the more efficient the learning, just as with children. I always asked trainers to be enthusiastic in their exchanges with Alex and to emphasize the targeted labels, just as adults tend to talk to young children. With all this in place, we would have, I believed, the potential to explore the workings of a bird's brain as had never before been done.

Or at least that's what I argued in my grant proposal. Apparently, the review panel was not impressed. On August 19, just two weeks after the "by George he's got it" moment, I received a letter from the panel that essentially asked me what I was smoking. They implied I was crazy to even imagine that a bird brain could master the language and cognitive skills I was hoping to demonstrate.

And they further implied I was even crazier to shun the accepted approach of operant conditioning and adopt this highly suspect method of social interaction.

I shouldn't have been surprised. In retrospect, I was perhaps a little naive to expect the panel to give a grant to someone with no training and no qualification in psychology—or any biological science, for that matter—for a project that was at the very edge of what was then known and accepted. I was driven, however, and extremely confident that what I was proposing was going to work. So I was surprised, and very upset—so upset that Alex appeared to think from my behavior that I was angry with him. He cowered from me. “Oh, it's not you, Alex,” I said to the poor guy. “It's those damned idiots who can't get out of their old ways of thinking. I guess we're just gonna have to try harder, buddy.”

Nothing was going to stop me. Nothing was going to stop us. Alex and I pushed on with our work together, helped by Marion and a series of enthusiastic students. We introduced new objects—and new labels—to Alex, and he soon became a proficient, if occasionally recalcitrant, student. By the summer of 1978, a year after we started, Alex was demonstrating 80 percent accuracy in labeling seven objects and was beginning to learn colors, too, green and red (or rose, as we called it, to ease pronunciation). He was performing well enough on the strict tests we put him through that I felt I could reapply for a small grant, once again to the National Institute of Mental Health. All I was asking for was \$5,000.

This time I was successful. In the pink summary statement I received that September, the panel described my proposal as “appealing.” They said that “Alex is probably the best-treated parrot in captivity.” Best of all, they concluded: “Approval was unanimously recommended.” I was elated, of course, and did a dance of joy and relief. But there was a kicker: although the grant proposal was approved in theory, in practice there were insufficient funds available for me to receive any money. I was still in the same boat: no research funding, no research position. But at least I had Alex and his ever-growing list of accomplishments, and a few scientists had taken notice.

Onward we progressed, with more objects and another color, blue. I also introduced Alex to the concept of shape, which was related to number. A square, flat piece of wood we labeled “four-corner wood,” and a triangle “three-corner wood.” I struck a

bargain with the guys in the woodshop at Purdue: they would supply me with four-corner and three-corner pieces of wood, and I would bake them cookies. In the absence of a grant to pay for such things, I had to be creative. In the end, the guys made the shapes from maple scraps, because Alex would destroy pine wood shapes in seconds; maple was much more of a challenge to chew to bits. And Alex loved challenges.

Along the way, Alex learned to say “no” and mean it. During our first year together, Alex had several ways of communicating displeasure or negativity of some kind. When he didn't want to be handled, for instance, he produced a high-decibel sound best conveyed as raaakkkk. He sometimes accompanied this extremely unpleasant noise with an attempt to bite, just in case his message had been misunderstood. When he didn't want to respond to a trainer asking him to identify an object, Alex would often simply ignore the trainer: he might turn his back or indulge in some suddenly urgent preening. He indicated that he had finished with his water or with a labeled object by simply tossing it on the floor. Give him banana when he'd asked for a grape, and you were likely to end up wearing the banana. Alex was not subtle.

Alex heard the word “no” a lot, from me or other trainers, when he incorrectly identified an object or was up to no good. By the middle of 1978 I noticed that Alex occasionally produced a “nuh” sound in situations where “no” would have been appropriate. “OK, Alex,” I said, “why don't we train you to say it right?” Within a very few sessions, Alex replaced “nuh” with “no” in distress situations, such as not wanting to be handled. Very soon he used it to mean No, I don't want to. Here's an example of Alex with a well-developed sense of how to use “no.” Kandis Morton, a secondary trainer, was working with Alex in April 1979:

K: Alex, what's this? [Holding a four-corner wood]

A: No!

K: Yes, what is this?

A: Four-corner wood [indistinct].

K: Four, say better.

A: No.

K: Yes!

A: Three ... paper.

K: Alex, “four,” say “four.”

A: No!

K: Come on!

A: No!

Alex was obviously in an especially obdurate mood that day, and was using “no” to express his unwillingness to go along with the training session. (He became even more creative in this respect as he grew older.) It was amusing, unless you happened to be the trainer trying to get some work done. Alex's use of the negative in this way represented a relatively advanced stage of linguistic development.

A few months after this session with Kandis, I had a set-to with Alex that provoked me to write in my journal: “Alex definitely understands NO!” By this time he had developed a passion for corks. On this particular August day he obviously wanted only the best of corks to chew. I gave him a new one. He contentedly proceeded to destroy it for a couple of minutes. When it was about two-thirds gone he dropped it. “Cork,” he demanded.

“You have a cork, Alex,” I said.

“No!” He picked up the sizeable remnant and tossed it on the floor. If he were human, I would have added that he did it with contempt. “Cork!”

I gave him a cork fragment, again sizeable but not complete. He snatched it from me, tossed it right back at me, and repeated even more urgently and impatiently, “Cork!” He would shut up only when I gave him a new, unblemished cork.

“This happened all morning,” I wrote. I had wanted him to learn labels, and to express his wants. I guess I had succeeded. Even at this early stage in our relationship, Alex was already showing that he was no birdbrain, no matter what the scientific establishment thought.

## Lesson Plan for Irene Pepperberg's *Alex & Me* by Dana Lambert MEd in Education & Social Policy, Northwestern University

In her book, *Alex & Me*, Irene M. Pepperberg affirmed her notion that animals, in particular birds, do not need to have a brain that looks human to possess complex cognitive abilities. Over a thirty-year period, Pepperberg and her African Grey parrot Alex proved that we live in a world inhabited by creatures capable of performing cognitive

tasks comparable to human intelligence. Alex could add, sound out words, and understand concepts like bigger, smaller, more, fewer, and none.

Perhaps even more astounding than Alex's cognitive achievements in the lab was the deep human-animal bond Pepperberg and Alex shared. Alex, Irene estimates, had the emotional equivalent of a two-year-old human. As the book states, "Alex missed Irene when she was away. He was jealous when she paid attention to other parrots, or even people. He sometimes became bored by the repetition of his tests, and played jokes on her. Sometimes they sniped at each other. Yet nearly every day, they each said, 'I love you.'" Her emotional connection with Alex is a side of their relationship that never made it into research journals and science articles, yet it had a profound effect beyond science.

As anyone who has ever owned a pet can attest, there is more to the mind than meets the eye. Research on the cognitive abilities of animals, animal behavior, and animal communication has great importance in our society. The human-animal connection continues to captivate people, evident in the plethora of television series seen on the Discovery network Animal Planet: "Orangutan Island," "Escape to Chimp Eden," "Stranger Among Bears," "Most Extreme," "Animal Cops," and "Crocodile Hunter Diaries," among many others. As a class, we'll explore the defining characteristics of relationships within and across species and in our own lives. We will also examine what kind of implications such relationships and/or cognitive achievements may have on humankind.

### Essential Questions:

- What is cognition? What does it mean to be intelligent? How does animal intelligence differ from human intelligence? How does intelligence relate to a species' ability to form relationships?
- What are some defining qualities of human relationships? In other words, what are some definable qualities that all humans in relationships share? Are there different types of relationships and, if so, what qualities are similar or different between those types of relationships?
- What are some hallmarks of animal relationships? For example, what kind of relationship traits do you witness in dog packs? Are the qualities similar or different between other kinds of animal relationships, like cats?
- What essential characteristics define a relationship between a human and an animal? In other words, how do you define a relationship between species?

### Goals:

- To define and understand "intelligence"
- To explore different kinds of relationships and to understand the essential, shared, definable features of the those relationships
- To compare and contrast the relationship characteristics between humans and animals

- To think about the implications animal-human relationships have on mankind

### Materials:

- This lesson will primarily draw from students' own observations, experiences, and opinions,
- <http://www.worldsciencefestival.com/video/avian-einsteins-full> (optional)
  - A writing medium (i.e. paper/pen, computer, etc.)

### Time Frame: 3-5 days

### Process and Procedure:

#### Part I (Analysis)

- 1.Begin by discussing the definition of cognition and intelligence. Does the definition of intelligence change depending on species or should the same definition be applied to all species? Do relationships between/within species depend on the level of intelligence?
- 2.Brainstorm the different types of human "relationships" (ie. family, friend, work, peer, mentor, etc) and the essential characteristics of those relationships. Make a list of the students' ideas, and look for similarities among the varying relationships.
- 3.Discuss relationships formed by animals. Are animal species capable of relationships? Do dogs, cats, other pack animals, apes/monkeys form relationships? What are characteristics of animal relationships and how are they similar or different than human relationships?
4. Consider the excerpt from *Alex & Me* and discuss the relationship between Alex and Pepperberg. Did they have a relationship? What was unique about the relationship? Are Alex's cognitive feats related to his ability to form a relationship?
- 5.Optional: Visit (<http://www.worldsciencefestival.com/video/avian-einsteins-full>) to gain more insights into the intelligence of birds.

#### Part II (Exploration)

1. In light of Alex's achievements, what implications does this have for mankind? If animals have higher cognitive functioning than we originally thought, and the ability to form relationships, should this/does this ethically change the way we should think about animals in our man-made world? How does this effect the way we should view conservation efforts? Are we more obligated now to ensure each species needs (adequate land/ocean space, etc.) are met because they can "think and reason" like humans or can we continue to look at animals as a less intelligent life-form? Check out (<http://literati.net/Bekoff/marc-bekoff-books.htm>) for ideas.
- 2.Please prepare a ten-minute speech (3-5 pages) to be given at the World Science Festival that discusses the implications research on animal intelligence has for mankind. Please research and include at least two other examples of discovered animal intelligence and/or human-animal relationships to support your opinion. Cite your sources.

#### Part III (Extra Credit/Extension)

- 1.For extra credit, present your speech in front of the class.
- 2.For a deeper look, discuss how a bird's (or other species) cognitive abilities might be influenced by its adaptations to the environment (i.e. birds need to know how to migrate or what berries to eat).

**Assessment:** The assessment will be a speech, which will include examples drawn from the *Alex & Me* excerpt, as well as two other cited examples.